

COMMENT ON INSECTS IN OCEAN DRIFT OR TIDE LINE.

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I.

Insects on the tide line are frequently mentioned in the literature. There have been six particular references to this phenomenon with special reference to Heteroptera in the last twenty years. This past summer I spent two weeks at East Hampton, on the south shore of Long Island, and made day by day observations on this occurrence from August 4 to August 13. These follow practically as in my field notes.

August 9, 3:30 to 5:00 p. m., Standard Time.—Very little on the tide line, principally Coleoptera and Hymenoptera, but found a few Heteroptera, namely:

Corythucha associata O. & D., one; *Alydus pilosulus* H. S., one; *Podisus maculiventris* Say, one; *Orthoëa basalis* Dall, one; *Eremocoris ferus* L., three; and *Pseudocnemodus canadensis* Prov., four, long-winged.

The day was clear and bright, temperature above 75°, wind moderate and on-shore; tide near ebb. This was the first quiet day after a series of days since August 4 of high winds, rough water and heavy surf, on none of which was anything found.

August 10, 4 to 6 p. m., Standard Time.—Again to the same mile-and-a-half stretch of beach between East Hampton and Amagansett. The majority of insects to-day were Coleoptera, although there were quite a few Hymenoptera also. Of the beetles, coccinellids were the most abundant, followed by Longicorns. The Heteroptera at first were not very abundant, but later the out-flowing tide line gave goodly numbers. Perfect and imperfect specimens were kept to show the proportion in numbers of species and families. The species secured were: *Stenopoda culiciformis* F., 1; *Eremocoris ferus* L., the most common species, of which 14; *Pseudocnemodus canadensis* Prov. followed next in abundance, 13 being found, all long-winged; *Apateticus bracteatus* Fitch, 1; *A. cynicus* Say, 2, male and female; *Acrosternum hilare* Say, 2, male and female; *A. pennsylvanicum* Deg., 2, male and female; *Euschistus politus* Uhler, 1; *E. variolarius* P. B., 14; *E. euschistoides* Voll., 1; *Podisus maculiventris* Say, 1; *Hymenarcys nervosa* Say, 1; *Corythucha associata* O. & D., 2; *Neur-*

octenus elongatus (Osb.) Blatchley, 1; *Alydus eurinus* Say, 4; *A. pilosulus* F., 1; *Lygaeus kalmii* Stål, 7; *Blissus leucopterus hirtus* Mont., 2, long-winged; *Coenus delius* Say, 2; *Ischnorhynchus geminatus* Say, 1; *Pagasa fusca* Stein, 1, long-winged; *Hypogeocoris piceus* Say, 1, long-winged; *Harmostes reflexulus* Say, 1; *Ligyrocoris diffusus* Uhl., 4.

The day was an ordinary warm summer day; and there did not appear to be any special flight of insects. The sky was clear, the sun bright, and the wind from the water (on-shore). The ocean was very calm and the breakers small, if any. Most of the insects, except the Coleoptera, were badly water-logged, and many dead and much bedraggled.

August 12, 2 to 3: 15 p. m., Standard Time.—The same stretch of beach as on the 10th. The catch was very poor. Very little débris of any kind on the tide-line. The tide was on the turn. The day was more or less clouded, the wind S.E., quartering on-shore. Temperature 76° to 78° F. The majority of the insects found were coccinellids, some fresh and active, others remnants from two (?) days before, picked clean of the soft parts by the many sand-fleas (*Orchestia* sp.). Only four Heteroptera were found on about 1,000 feet of beach; 1 *Podisus placidus* and 3 *P. maculiventris*. There was a conspicuous absence of the forms abundant on the previous Tuesday (the 10th).

August 13 was a blank day. Noted on the beach, all told, 6 beetles—two coccinellids, one active; one *Doryphora*, very much alive; one *Longicorn*, one small dorbeetle and one small carabid, all dead and dry. The night before, ushered in by a heavy sea-fog after 4 p. m., was very rainy; and this day was more or less cloudy and sultry; the wind about S. to S. E., temperature about 78° F., tide on the turn and beginning to flow. The 14th was another barren day. The net result was 3 long-winged *Pseudocnemodus canadensis*. There were also a few Hymenoptera and more abundant beetles, mainly coccinellids. The day had been warm in the morning with a sudden spat of rain at noon; temperature up to 86° F. and above, quite humid but not so moist as the day before. The wind was about S.W., light; the tide out and slack; very little drift on the shore.

In *Psyche* (vol. xxxiii, pp. 110-115, for August-October, 1926) Dr. J. G. Myers has an article on "Heteroptera in Ocean Drift," which he starts by saying that: "The presence of occasional terrestrial insects or their remains in beach drift is a phenomenon of

little ethological significance," a dictum in which I heartily agree and go further: It is of no significance at all!

Let us consider the data preceding, obtained at the one place and over a period of time when most of the summer bugs are matured and also at a particular time of the day.

August 9.—Bright and clear; temperature above 75° , wind moderate on-shore; tide near ebb. Bugs caught: Species, 6; number, 11.

August 10.—Bright and clear; summer temperature (80° ?); wind on-shore; tide ebbing, ocean very calm. Bugs: Species, 24; number, 79.

August 12.—More or less clouded; temperature 76° – 78° , wind about S.E., quartering on-shore; tide on the turn. Bugs: Species, 2; number, 4.

August 13.—More or less clouded; temperature 78° , sultry; wind, S.–S.E., quartering on-shore; tide on the turn and beginning to come in. No bugs found, only 6 beetles. The night before was rainy.

The two days of abundant insects on the tide line have this in common: clear and bright; on-shore wind; tide ebbing. The two unfavorable days were cloudy, wind quartering on-shore; and tide on the turn toward flow.

It is obvious, therefore, since insects fly on clear warm days, and go in any direction, that those that fly over water sooner or later will fall in, for whatever reason—exhaustion, lure of the sparkling water, or what not. Now, if the wind is off-shore, that is, blowing away from the land, the insects naturally, since they are on the surface, will be blown out to sea; and, of course, lost to students. But if the wind is on-shore, that is, blowing from the sea to the land, a sea breeze, the drowning insects will be blown toward the shore with the waves, and the tide does the rest. The condition is more favorable at ebb tide, because then the receding waters deposit their floating burden of all kinds on the sands.

It follows, therefore, that Dr. Myers is right, and this phenomenon appears to have no ethological significance, whatever may be its utility to the collector who is enriched by the rare species found on the beach.

II.

The species found, ordered in accordance with Hemiptera of Connecticut, our standard manual for the species of this latitude, are the following: No aquatics, mirids, nor the smaller groups:

NABIDAE: *Pagasa fusca* Stein, 1 of the rare macropterous form. Not before noted in the drift.

REDUVIIDAE: *Stenopoda culiciformis* Fab., 1.

TINGITIDAE: *Corythucha associata* O. & D. Three of this very abundant form on Long Island wild cherry (*Prunus serotina*).

LYGAEIDAE: *Lygaeus kalmii* Stål, 7 specimens; *Blissus leucopterus hirtus* Mont., long-winged, 2; *Hypogeocoris piceus* Say, 1, of the rare long-winged form not found previously in drift; *Ischnorhynchus geminatus* Say, 1; *Ligyrocoris diffusus* Uhl., 4; *Orthoeca basalis* Dallas, 1; *Pseudocnemodus canadensis*, 17; long-winged of this normally apterous form; *Eremocoris ferus* Say, 17 of this common species. These two last are the commonest Lygaeids in drift.

ARADIDAE: *Neuroctenus elongatus* (Osb.) Blatchley, one of this species, here recorded for the first time from New York, it being known heretofore from Indiana, North Carolina, Ohio, Washington, D. C., and Pennsylvania; first time recorded in drift.

ALYDIDAE: *Alydus eurinus* Say, 4; *A. pilosulus* H. S., 2.

CORIZIDAE: *Harmostes reflexulus* Say, 1.

PENTATOMIDAE: *Euschistus euschistoides* Voll, 1 specimen; *E. politus* Uhler, 1; *E. variolarius* P. B., 14 specimens; *Coenus delius* Say, 2; *Hymenarcis nervosa* Say, 1 only; *Acrosternum pennsylvanicum* Deg., 2, male and female; *A. hilare* Say, 2, male and female; *Apateticus cynicus* Say, 2, male and female; *A. bracteatus* Fitch, 1 male; *Podisus maculiventris* Say, 5 specimens; *P. placidus* Uhler, 1.

The most abundant groups, as might be expected, are the Pentatomidae, 11 species and 32 specimens, and the Lygaeidae, 8 species and 50 specimens. The other 6 families number only 7 species and 13 specimens out of the total of 26 species and 95 specimens found.

This relative abundance of the two families obtains throughout the summer. Of the other groups, some are more abundant at one time than at another. For instance, Dr. Myers comments (p. 113, *op. cit.*) that the Aradids were very abundant in the spring beach material he had. This is as it should be, because in that case, the Aradids appear to fly and be active out of their shelters at about that time of year. Dr. Parshley and I collected abundance of *A. 4-lineatus*, sunning themselves and in flight at Leeds, Mass., on April 6, 1919; and I have taken this species at large occasionally at about that time of year here in White Plains, and

1 *A. niger* on July 19 and 5 *A. uniformis* Heid, and 1 *A. abbas* Bergroth. Obviously, *Aradus* or some of its species, notably *4-lineatus*, have some sort of spring activity.

The heretofore unnoted species here enumerated bring the total of Heteroptera thus found in beach drift to 98 species.

III.

At this point it may be useful to note all the literature that has come to my notice so far covering this phenomenon as noted in my papers cited and in Dr. Myers's article. Those marked * are cited from other papers and have not been seen by me.

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A correction to No. 2.—Plate VI, Membracidae, should be numbered VIII, the left bottom figure of this plate should be numbered 4.